

***United States Court of Appeals
for the Second Circuit***



**APPELLANT'S
BRIEF**

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United States Court of Appeals
FOR THE SECOND CIRCUIT

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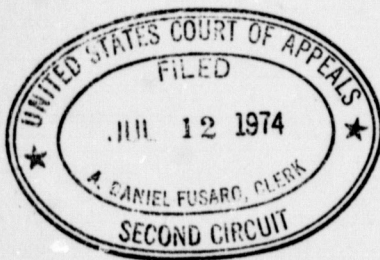
MOBIL OIL CORPORATION,
Plaintiff-Appellee,

v.

W. R. GRACE & COMPANY,
Defendant-Appellant.

ON APPEAL FROM THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF CONNECTICUT

DEFENDANT-APPELLANT'S BRIEF



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The following abbreviations are used in this brief:

- PX- —Plaintiff's trial exhibit No.
- DX- —Defendant's trial exhibit No. x
- Blazek, Tr. —Testimony of named witness, e.g., Blazek,
 appearing at page of the trial transcript.
- Dep. Tr. —Pre-trial deposition transcript.
- Op. —Opinion of Court below as reported at 367
 F. Supp. 207.

Emphasis is ours throughout, unless otherwise indicated.

BRIEF OF APPELLANT

I. STATEMENT OF THE ISSUES PRESENTED FOR REVIEW

This appeal, pursuant to 28 U. S. C. § 1292(a)(4), from an interlocutory judgment holding three patents valid, enforceable and infringed, presents the following issues:

1. Did the lower Court err in not holding each of patents 3,140,249, 3,140,253 and 3,436,357 invalid for failure to measure up to the patentability criterion of 35 U. S. C. § 103, because the subject matter of the patents would have been obvious?

2. Did the lower Court err in not holding patents 3,140,249, 3,140,253 and 3,436,357 unenforceable for patent misuse, on the ground that plaintiff's licensing practices and policies are contrary to public policy and in violation of the antitrust laws?

3. Did the lower Court err in holding that patents 3,140,249, 3,140,253 and 3,436,357 are infringed?

4. Did the lower Court err in granting injunctive relief against a defendant not engaged in direct business competition with plaintiff?

II. STATEMENT OF THE CASE

A. The Nature of the Case, the Course of Proceedings and the Disposition in the Court Below

This is an action brought by Mobil Oil Corporation ("Mobil") against W. R. Grace & Co. ("Grace") under 35 U. S. C. § 281 for alleged infringement of Plank and Rosinski patents 3,140,249, 3,140,253 and 3,436,357. The District Court's jurisdiction was based on 28 U. S. C. § 1338(a).

On May 29, 1967, Mobil commenced actions for alleged patent infringement against Grace and Pontiac Refining Corp. in the United States District Court for the Southern District of Texas.

On August 4, 1971, an order was entered transferring the action against Grace to the District of Connecticut. *Mobil Oil Corporation v. W. R. Grace & Company*, 334 F. Supp. 117 (S. D. Tex. 1971). On November 16, 1971, trial of the trans-

ferred action commenced before the Honorable T. Emmet Clarie, United States District Judge for the District of Connecticut, and lasted 16 days. Thereafter, proposed findings of fact and conclusions of law, briefs and reply briefs were submitted.

On November 2, 1973, the District Court filed its Memorandum of Decision, reported at 367 F. Supp. 207 (D. Conn. 1973). The memorandum decides each ultimate issue in favor of Mobil: it holds valid, enforceable and infringed each patent claim asserted by Mobil; it awards Mobil injunctive relief and an accounting for damages. Requests by Mobil for increased damages and attorney fees were dismissed without opinion at a post-decision hearing. Mobil has not appealed from that dismissal.

An interlocutory judgment, final except for accounting, was entered on December 26, 1973. A stipulation and order, filed the same day, stayed the injunction and accounting pending determination of this appeal and any other review of the judgment.

Notice of appeal from the portions of the interlocutory judgment unfavorable to Grace was filed on January 22, 1974.

B. Statement of Facts

1. Technical Background

"Cracking catalysts," used in processes which refine petroleum "gas oil" into "gasoline," are the technical subject matter of this case (Op. 211, 214). Cracking catalysts are employed for the purpose of accelerating "cracking," the chemical reaction which converts gas oil into gasoline (Op. 214). Gas oil is a mixture of long, heavy petroleum molecules* (Op. 214). Gasoline is a mixture of molecules lighter and shorter than those included in gas oil (Op. 214; Turkevich, Tr. 2011-12).

As found by the District Court (Op. 211), the Mobil patents

"relate to gas oil cracking catalysts, and are composed of a composite of an amorphous (non-crystalline) matrix, such as silica-alumina gel, together with a crystalline

*Petroleum molecules are properly classed as "hydrocarbons." They include hydrogen and carbon (Op. 214). Processes which convert the size or shape of hydrocarbons are called "hydrocarbon conversion" processes (Turkevich, Tr. 1918-20, 1926; Dr. Turkevich was Grace's expert witness; Mr. Kirkbride was Mobil's).

aluminosilicate. The latter substance is more commonly referred to in the art as a 'zeolite' or a 'molecular sieve' type catalyst."

These catalysts may properly be referred to as "large pore zeolite-containing" cracking catalysts. They contain two principal components: a "large pore zeolite" component and a "matrix" component. A "large pore zeolite" is a crystalline material which, in the words of Mobil's patents, has "uniform pore openings between 6 and 15 Angstrom units in diameter"* (PX-2, col. 3, lines 44-45). Such zeolites are also sometimes called crystalline aluminosilicates, metallo aluminosilicates, or molecular sieves. The "matrix" component, in which the zeolite component is dispersed or distributed by mixing the two components, is an amorphous (i.e., non-crystalline) material (Op. 211). Because these catalysts contain more than one component, they are referred to as "composite" catalysts.

Both the large pore zeolite and matrix components contain, or have associated with them, "cations," or "ions."** Ions are atoms or groups of atoms which carry one or more positive electrostatic charges (Op. 219 n. 4). For example, sodium ions are positively charged sodium atoms. The ions associated with a large pore zeolite or with a matrix may be replaced with other ions (Rosinski, Tr. 339-41; Turkevich, Tr. 1917-18, 1922-23, 1925, 1965-66). The process of replacing one ion with another is known as "base exchange" (Op. 219 n. 3), or "ion exchange" (e.g., DX-AG, col. 6, lines 49-51; Turkevich, Tr. 1965).***

The issues of patent validity and patent infringement appear at first impression to be technologically complex. But to resolve these issues, it is not necessary to deal with any of the following technical matters:

- (a) the chemistry involved in refining gas oil to produce gasoline;

*An Angstrom is a unit used to express sub-microscopic distances (Op. 218 n. 2).

**The terms "cations" and "ions" are used interchangeably in this brief, as they were at trial (Op. 219 n. 4).

***In the language of the District Court (Op. 219):

"In addition, [zeolites] usually have associated with them, in the form of electrically charged ions, some metal, such as sodium, magnesium, or rare earth metals (Turkevich Tr.

(b) the synthesis of crystalline zeolites and the details of their characteristics and structure;

(c) the intricacies of ion exchange, beyond the fact that it occurs; or

(d) the manner in which zeolite-containing cracking catalysts operate to perform their cracking function.

As is often the case, an understanding of the issues is more a matter of vocabulary than of technical niceties. For this reason, we have included a glossary as an appendix to this brief.

2. The Mobil Patents

Each of the three Mobil patents in suit relates to large pore zeolite-containing catalysts, to methods of making such catalysts, and to the use of such catalysts to crack gas oils. The 3,140,249 patent is the broadest of the three.* The 3,140,253 patent and the 3,436,357 patent are supplements to the '249 patent.**

2049-2051). The ions of a particular metal associated with such zeolites may be replaced by, or exchanged with, ions of another metal or ions of a non-metal (e.g. ammonium). The result is accomplished by an old and conventional technique called base-exchange, in which the zeolite is washed with a solution containing the replacement ions (Rosinski Tr. 339-41; Turkevich Tr. 1965). Thus sodium ions originally associated with a crystalline zeolite may be replaced in whole or in part by magnesium ions, rare earth ions, ammonium ions, or a combination of ions (Turkevich Tr. 2014-2015)." (Footnote omitted)

*The District Court referred to the claims of the 3,140,249 patent as "basic" (Op. 226). The patent itself refers accurately, and more modestly, to the catalyst of the patent as "an improved catalyst" (PX-2, col. 1, lines 11-14).

**Synthetic zeolites X and Y, the large pore zeolite components of Mobil's patents, became available, and then only in limited quantities, shortly before Plank and Rosinski, named as inventors in Mobil's patents, made their alleged inventions. The District Court found that Plank and Rosinski made the alleged invention of the '249 patent in 1957 (Op. 220). Zeolite X became available in 1956 (Rosinski, Tr. 751), in quantities so limited that as late as 1958 Rosinski had to synthesize his own (Rosinski, Tr. 836-37). Zeolite Y became available in 1960 (Rosinski, Tr. 937). Plank and Rosinski made the alleged invention of the '357 patent, which requires zeolite Y, in the same year (Op. 228).

The catalysts which are the subject of patent 3,140,249 (the '249 patent) contain two principal components: a large pore zeolite component and a matrix component (PX-2, col. 25, lines 51-56), with which the zeolite is mixed to dilute its cracking activity (PX-77, p. 100). These catalysts contain no more "than about 1 weight percent sodium" (PX-2, col. 25, line 56).

The catalysts of patent 3,140,253 (the '253 patent) also contain two principal components: a large pore zeolite component and a matrix component (PX-3, col. 42, lines 71-73, 67-68, col. 41, lines 37-42). The '253 patent also suggests sodium removal, specifying that the large pore zeolite component have not more than 25% of the full complement of sodium ions which were originally associated with the zeolite component when it was synthesized.* The remaining 75% of original sodium ions must be replaced by ion exchange (PX-3, col. 10, lines 67-73; Rosinski, Tr. 557-58). The '253 patent specifies also that the replacement ions must include hydrogen ions (or ions—called "hydrogen precursors"—which can be converted into hydrogen ions by heating)** and ions of a "rare earth metal"*** (PX-3, col. 10, lines 67-70). The function of the rare earth metal ions is to enhance the catalyst's stability (PX-3, col. 11, lines 45-50).

The catalysts of patent 3,436,357 (the '357 patent) also contain two principal components: a large pore zeolite component and a matrix component (PX-1, col. 20, lines 33-44).† The '357 patent requires that the large pore zeolite component of its catalysts be a specific large pore synthetic zeolite, one known as "zeolite

*Synthetic zeolites are customarily synthesized in the "sodium form," i.e., the ions associated with them are sodium ions (DX-AG, col. 2, lines 18-22; Turkevich, Tr. 1965).

**Ammonium ions are hydrogen precursor ions (PX-3, col. 5, lines 3-8; Turkevich, Tr. 2014-15).

***Rare earth metals are a class of metals, all of which have similar properties. They are identified by name in the '253 patent (PX-3, col. 5, lines 46-49; Op. 221 n. 11).

The terms "rare earth metal" and "rare earth" are used interchangeably in this brief, as they were at trial (e.g., Op. 244).

†These catalysts may also contain a third component—called "a secondary solid additive" (PX-1, col. 20, lines 40-45). The function of the third component is to improve the "diffusivity" of the catalysts (PX-1, col. 20, lines 40-41). "Diffusivity" is a quality which characterizes the ability of molecules to diffuse or pass through a catalyst (DX-AF, col. 2, lines 41-43; Turkevich, Tr. 1950).

Y" (PX-1, col. 20, line 33, col. 1, lines 57-58). Zeolite Y, the second large pore zeolite to be synthesized, was preceded by synthetic zeolite X, which was used in the preparation of the catalysts described in Mobil's '249 patent (Rosinski, Tr. 529-31). The '357 patent asserts that catalysts containing zeolite Y are more active and more selective than other zeolite-containing catalysts (PX-1, col. 2, line 27). The District Court accurately observed that "The real difference between the '357 patent and the '249 [patent] . . . is that it [the '357 patent] incorporates the 'Y' type zeolite" (Op. 223).

3. The Prior Art

A summary of the pertinent teachings of the prior art, developed in greater detail in the Argument section of this brief, follows.

The prior art establishes that:

(1) The components of Mobil's patented catalysts were in the prior art.

(a) Silica-alumina and clay (the alternative matrix components) had been used for years as cracking catalysts (Op. 217).

(b) Large pore synthetic zeolites X and Y (the alternative zeolite components) were in the prior art, having been invented by Union Carbide (Op. 241-42).

(2) The catalytic cracking qualities of the individual components of Mobil's patented catalysts had been recognized earlier by others.

(a) Silica-alumina and clay (the matrix component) had been used for years as cracking catalysts (Op. 217).

(b) The catalytic cracking capability of large pore synthetic zeolites (the zeolite component) was taught in prior art patents or patent applications owned by Esso (Op. 242-43) and Union Carbide (Op. 244).

(3) Plank and Rosinski were not the originators of two-component composite cracking catalysts made up of large pore zeolites distributed in a matrix. Such a composite cracking catalyst consisting of zeolite X in a matrix is described, absent some of the detailed refinements later included in Mobil's patents, in the Fleck prior art patent (Op. 244-45).

applied for in December 1956, before Plank and Rosinski made the "inventions" in suit (Op. 228).

(4) The identical steps used by Plank and Rosinski (Rosinski, Tr. 762, 731-61; DX-BO, p. 169) to prepare their two-component large pore zeolite-containing composite catalysts were described in Mobil's prior art Schwartz patent for preparation of two-component composite catalysts consisting of a catalytically active, powdered ingredient dispersed in an inorganic oxide gel matrix (Op. 240-41).

(5) The detailed refinements embodied in Mobil's patented catalysts were also known in the art.

(a) The importance of low sodium in cracking catalysts, emphasized in all of Mobil's patents, had been recognized for many years (Op. 240).

(b) The use of rare earth metals plus hydrogen as replacement ions, emphasized in Mobil's '253 patent, was taught in the prior catalyst art (Op. 244).

(c) The superiority of zeolite Y over other zeolite catalysts, emphasized in Mobil's '357 patent, was recognized in the prior catalyst art (Op. 244). The ability of powdered additives to impart diffusivity, an additional aspect of Mobil's '357 patent, was taught in the prior cracking catalyst art (Op. 241).

In essence, Mobil's patents are directed to monopolizing composite catalysts made up of two old components, each separately recognized in the prior art as a cracking catalyst, mixed together, and treated by ion exchange, as taught in the prior art, to enhance their cracking qualities.

4. The Patent Misuse Defense

The facts on which Grace's patent unenforceability defense is based are few and controlling:

(a) Mobil owns a large number of patents relating to large pore zeolite-containing cracking catalysts. Gaboriault, Mobil's chief patent counsel, testified that by 1968 Mobil had accumulated about 40 such patents (Gaboriault, Tr. 3078).

(b) During extensive negotiations preceding commencement of this action, Grace repeatedly requested a license

under a single one, or under less than all, of Mobil's cracking catalyst patents. Mobil never acceded to these requests, preferring to license all of its patents, rather than individual patents. During these negotiations, Mobil never set any royalty rate for a license under a single patent which was lower than the royalty rate set by Mobil for a license under the full package of Mobil's patents.

(c) After commencement of litigation and in May 1968,* Mobil made a proposal to Grace (PX-322) which included the following:

Patents to be Released for Past and Licensed for Future	Past Infringement Liability to be Paid, % of Net Sales Price	Future Royalty in License Agreement, % of Net Sales Price
All Mobil	12% until 4/11/67 8.4% after 4/11/67	8.4%
Five Mobil	12% until 4/11/67 8.4% after 4/11/67	7%

The net of this proposal was that:

(1) Mobil's royalty rate for Grace's pre-1968 activities was the same, whether the rights to be granted were under *all* of Mobil's forty patents or under only *five* of Mobil's patents.**

(2) Mobil's royalty rate for rights for the future (1968 on) under *all* of its patents or for rights under only *five* patents differed by only 1.4% (8.4% for all patents; 7.0% for five patents).

5. The Infringement Issue

In this case, as in all patent actions, resolution of the infringement issue depends upon the words of the patent claims asserted and the details of the challenged products. The claims relied on

*This offer came about as a result of a conference between Grace and Mobil counsel on March 7, 1968, at which Grace asked Mobil for its price for a license under the patents then in suit (PX-322; Gaboriault, Tr. 3083-85).

**Mobil selected these five patents in response to a specific request by Grace for a license under the three patents then in suit between Mobil and Grace. One was withdrawn with prejudice before trial of this action, and two of the five were never formally asserted against Grace in this, or any other, action. Only two of them are included among those litigated against Grace.

by Mobil are intricate and detailed, and consequently the infringement issue is intricate and detailed.

Some broad observations are, however, helpful as a backdrop to the infringement issue.

Since the 1940's, catalytic cracking has been accomplished by two different processes: (1) the moving-bed process, and (2) the fluid process (Kirkbride, Tr. 184-85). In its April 1964 "Report of the Catalyst Study Group," Mobil recognized that the moving-bed and fluid catalyst markets are "essentially unrelated" because "the physical or chemical characteristics of the catalysts" are "widely different" (DX-PQ, p. 00123). The District Court described the differences between moving-bed and fluid cracking catalysts (Op. 216).

Mobil has concentrated its cracking catalyst activities in the moving-bed field, and Grace has concentrated its activities in the fluid catalyst field (Op. 223). Mobil manufactures and sells moving-bed cracking catalysts incorporating large pore zeolites (Drew, Tr. 1845; Van Tilburg, Tr. 1858-59), and Mobil employs moving-bed catalytic cracking units at all but one of its refineries (Drew, Tr. 1848-49). Mobil has sold some fluid cracking catalysts made with large pore zeolites, but those catalysts were not manufactured by Mobil (Drew, Tr. 1854; Van Tilburg, Tr. 1858).

In direct contrast to Mobil's involvement in the moving-bed field, Grace's involvement has been strictly in the manufacture and sale of fluid cracking catalysts, a market six to seven times larger than the moving-bed catalyst market (Blazek, Tr. 2254). Grace is a leader in the manufacture and sale of fluid cracking catalysts, approximately 75% of which are supplied by two companies, Grace and Filtrol Corporation (Blazek, Tr. 2253-54).

Mobil's focus on moving-bed technology is reflected in the developments described in, and the teachings of, the patents in suit. Mobil offered no evidence of any experimental work by Plank and Rosinski (named as inventors in all three patents in suit) with fluid catalysts up to May 1962, the filing date of the last of the applications for the patents in suit. The patents in suit do not contain a single example of a fluid zeolite-containing composite cracking catalyst. They should be correspondingly limited in the scope of their protection to moving-bed, rather than fluid, catalysts.

A second significant background fact with respect to infringement is Grace's independent development of its challenged fluid cracking catalysts. The Davison Chemical Division of Grace has been in the fluid cracking catalyst business for many years (Goodall, Tr. 2733). By the spring of 1962, Grace had heard of Mobil's new moving-bed catalyst and had heard rumors that it contained molecular sieves (large pore zeolites) and rare earths (Blazek, Tr. 2260; PX-728, tab 4). Also, Grace had obtained in normal course a copy of Mobil's South African patent* relating to Mobil's new moving-bed catalyst (Goodall, Tr. 2735-36; Blazek, Tr. 2270), and Grace had attempted, with the teachings of that patent before it, to prepare fluid catalysts containing large pore zeolites. Grace's efforts to do so were specifically found by the District Court to be "unsuccessful" (Op. 223). The catalysts prepared according to Mobil's teachings lacked the requisite steam and thermal stability for use in the fluid catalytic cracking field (Blazek, Tr. 2273-77; DX-MB).

Undeterred by the discouraging results in its attempts to follow the teachings of Mobil's patents, Grace embarked on a several-year research and development program, which culminated in the development of a large pore zeolite stable enough for fluid catalysis (Blazek, Tr. 2286-89; DX-MD). Grace has not copied its challenged products from Mobil or from Mobil's patents. The equities are not weighted in favor of Mobil on the infringement issue.

III. ARGUMENT

A. Mobil's Patents Do Not Contribute Anything Non-Obvious over the Prior Art

Grace's invalidity defense with respect to all three Mobil patents is based on their obviousness in light of the prior art, 35 U. S. C. § 103. This Court is fully familiar with the non-obviousness requirement of 35 U. S. C. § 103 and has frequently applied that criterion to hold that patent owners are not entitled to seventeen-year statutory monopolies. Some recent illustrative authorities are *General Tire & Rubber Co. v. Jefferson Chemical Co.*, F. 2d , 182 USPQ 70 (2 Cir. 1974); *Supreme Equipment & Systems Corp. v. Lear Siegler, Inc.*, F. 2d , 181

*That South African patent corresponds to the '249 patent in suit here.

USPQ 609 (2 Cir. 1974); *Carter-Wallace, Inc. v. Otte*, 474 F. 2d 529 (2 Cir. 1972); *Struthers Scientific & Int. Corp. v. Rappl & Hoenig Co.*, 453 F. 2d 250 (2 Cir. 1972); *Lemelson v. Topper Corporation*, 450 F. 2d 845 (2 Cir. 1971); *Indiana General Corp. v. Krystinel Corporation*, 421 F. 2d 1023 (2 Cir. 1970).

1. All of the Specifics of Mobil's Patented Catalysts Are Found in the Prior Art

The prior art, which necessarily must be discussed in some detail, establishes that the catalyst components, mixed together as described in the Mobil patents, were not contributed to the art by Mobil, and were not originally recognized in Mobil's patents as cracking catalysts. The remaining details of Mobil's patents are also found in the prior art.

Before making a detailed comparison between the Mobil patent claims in suit and the prior art, it will be helpful to focus on the three most pertinent prior art references, viz., Fleck, Kimberlin and Rabo '990.

(a) Fleck taught the combination of large pore zeolites and matrix components in a cracking catalyst

The Fleck patent was applied for in December 1956 and issued in 1960 (DX-AN, p. 1).*

Fleck discloses a large pore zeolite-containing cracking catalyst, more specifically a cracking catalyst composed of a large pore zeolite component and a matrix component (Op. 244-45; Turkevich, Tr. 2039-46). Fleck teaches that the large pore zeolite component (a "zeolitic metallo alumino silicate") may be combined with a matrix component of either acid-treated natural clay** or silica-alumina gel (DX-AN, col. 2, lines 53-64; Turkevich, Tr. 2039-46):

*The Fleck patent is in evidence as Defendant's Exhibit AN. Trial testimony regarding its teachings appears at Tr. 2038-81, 2139-2204, 2484-2516, 2564-79, 2585-99, 2634-58, 3154-80, 3205-06, 3231-32. The District Court's findings appear at Op. 244-45, 226, 213, 227, 229-31, 236-37, 240.

**Acid-treated clays have, like silica-alumina gel, been used alone (without other components) as cracking catalysts since the 1940's (Op. 245; Turkevich, Tr. 2046).

In an endeavor to minimize the impact of Fleck as prior art, by attempting to demonstrate that Fleck's catalysts had high sodium contents, the District Court found that Dr. Turkevich "did concede that

"It is another specific object of this invention to provide in such a cracking process a cracking catalyst which comprises a physical mixture of a cracking catalyst such as acid treated natural clay [a matrix] and a natural or synthetic zeolitic metallo alumino silicate having pores of at least 7 A. [Angstroms] in diameter [i.e., a large pore zeolite].

"It is a still further object of this invention to provide in a hydrocarbon cracking process an improved hydrocarbon cracking catalyst comprising a synthetic silica alumina gel [a matrix] prepared in the presence of such a natural or synthetic zeolitic metallo alumino silicate."

Fleck identifies, by chemical composition and pore size, its large pore zeolite component as zeolite X (DX-AN, col. 3, lines 72-75; Turkevich, Tr. 2048-49). The chemical composition which Fleck reports for zeolite X shows that it contains sodium ions (DX-AN, col. 3, line 75; Turkevich, Tr. 2049-52). Fleck teaches, however, that "Other desired metal cations may . . . be introduced [into the zeolite] by ion exchange" (DX-AN, col. 4, lines 3-4; Turkevich, Tr. 2052).*

Fleck comes within a hair's-breadth of the patents in suit. The sole difference between the Fleck catalyst and the '249 catalyst is in the latter's emphasis on sodium removal. The sole difference between Fleck and the '253 patent is in the specific ions (rare earth plus hydrogen) associated with the zeolite. The sole difference between Fleck and the '357 patent is in the use of

some of the clays used by Fleck contained as high as 2.68 weight percent of sodium oxide" (Op. 230). A review of Dr. Turkevich's testimony reveals no such concession. On the contrary, Dr. Turkevich's unequivocal testimony is that acid-treated clay, the type of clay specified by Fleck, is sodium free (Tr. 2068, 2142-44, 2041-43, 2242-43). The "2.68" figure cited by the District Court is contained in Plaintiff's Exhibit 762 which reports sodium oxide contents of clays which have not been acid treated. Acid treating removes sodium (Turkevich, Tr. 2144). The virtual identity between Fleck's composite catalysts and the catalysts of Mobil's patents is highlighted by the District Court's apparent necessity to deal, albeit erroneously, with such details.

*The District Court found, "At no place does Fleck specify the technique of ion exchange . . ." (Op. 245). This finding may be literally accurate but is substantively misleading. There was no reason for Fleck to "specify the technique of ion exchange." By Fleck's time, the technique of ion exchange was old and well known (Op. 219). Fleck needed to do no more than to refer to it.

a Y instead of an X zeolite. All of these embellishments are taught elsewhere in the prior art.

The District Court's discussion of Fleck is directed in large measure to whether or not Fleck "anticipated" the '249 claims in suit (Op. 229-31, 244-45), an issue which we do not press on this appeal. But the trial Court's comments and conclusions concerning the "nonobviousness" of the patents in suit over Fleck (Op. 231) are misdirected because Judge Clarie did not consider Fleck in conjunction with other prior art references. For example, a statement that "Fleck is entirely irrelevant to the '357 patent" (Op. 231) because Fleck does not mention Y zeolite (which had not yet been invented) misapprehends the legal test of obviousness. As we will show, it was obvious to substitute zeolite Y for zeolite X as the large pore zeolite component of Fleck's composite catalyst as soon as zeolite Y became available, because Rabo '990 taught that zeolite Y is a better catalyst than zeolite X.

(b) *Kimberlin taught that ion-exchanged forms of large pore zeolites are cracking catalysts and demonstrated this teaching with zeolite X*

The Kimberlin patent was applied for in 1957 and issued in 1961. It is assigned to Esso Research and Engineering Company (DX-AJ, p. 1).^{*} It discloses the large pore zeolite component of Mobil's '249 patent, adding to Fleck an explicit teaching that ion-exchanged (low sodium) forms of zeolite X are effective gas oil cracking catalysts. Kimberlin also taught to those skilled in the art that rare earth metal-exchanged zeolites were superior to amorphous catalysts used before Kimberlin's discovery (Op. 242-43).

Before discussing the details of its discovery, Kimberlin "refers to the previous amorphous catalysts available and cite[s] the former prevailing theory that, if any crystalline material were present in the final catalyst product, hydrocarbon conversion was seriously adversely affected . . ." (Op. 242). The District Court accurately characterized Kimberlin's discovery of a

^{*}The Kimberlin patent is in evidence as Defendant's Exhibit AJ. Trial testimony regarding its teachings appears at Tr. 1982-98, 2037-38, 2066, 2072-2128, 2139, 3258-60, 2375-76, 2687, 3181-89, 3204. The District Court's findings appear at Op. 242-43, 213, 240, 228-29, 227.

crystalline catalyst as being "in contrast" to this earlier teaching (Op. 242-43):

"In contrast to this, the Kimberlin patent states: 'a catalyst has been discovered that shows high activity and selectivity while comprising a highly ordered crystalline material characterized by having pores of nearly uniform dimensions in the range of about 6 to 15 Angstroms [i.e., a large pore zeolite]' (Col. 2, lines 26-30; Tr. 1984).'"*

Kimberlin teaches also (DX-AJ, col. 2, lines 53-58; Turkevich, Tr. 1984-87):

*The District Court's memorandum implies erroneously that Kimberlin's specification teaches that the new, crystalline, large pore zeolite catalyst should not be combined with an amorphous matrix (Op. 228-29). This is a plain misreading of Kimberlin; as the District Court's memorandum itself later points out, the prior art teaching that a crystalline material should not be combined with an amorphous material was "the former prevailing theory"; it did not survive Kimberlin (Op. 242)—or even Fleck (Op. 244-45).

Likewise, the District Court erred when it relied upon a limitation in claim 1 of Kimberlin for the conclusion that Kimberlin taught that a large pore zeolite catalyst should not be combined with a matrix (Op. 229). "The question is not what is the precise scope of the claims in [a prior art patent], but what is disclosed in the specification [of the prior art patent] and made known to the world." *Minerals Separation v. Magma Co.*, 280 U. S. 400, 402 (1930) (Holmes, J.).

The Kimberlin prior art patent issued with *claims* limited to cracking catalysts made up solely of zeolites. Shortly after issuance of its Kimberlin patent, Esso recognized that Kimberlin's claims were unduly and unnecessarily limited in this respect. Accordingly, Esso applied to the Patent Office for a reissue of its Kimberlin patent to cure that deficiency. The Kimberlin reissue patent is too late in time to qualify as prior art, but this does not mean that the reissue patent is not significant. The fact that the Kimberlin patent specification was not limited in its teachings to catalysts made up solely of zeolites is attested to by the Patent Office's reissue of the Kimberlin patent, without any change in its specification and, as recognized by Mobil and everybody else, with claims broad enough to embrace zeolite-plus-matrix catalysts (DX-WX, e.g., claim 23). *McCullough Tool Company v. Well Surveys, Inc.*, 343 F. 2d 381, 389 (10 Cir. 1965). If Kimberlin were limited to catalysts made up solely of zeolites, it would not be infringed by zeolite-containing composite catalysts and Mobil's patent counsel would not have characterized Kimberlin's reissue patent as dominating Mobil's zeolite-plus-matrix patents (Gaboriault, Tr. 3062-64).

"In accordance with the present invention, there is employed as a hydrocarbon conversion [*] catalyst a metal salt of a crystalline alumino-silicate [zeolite] having pore openings adequate to admit freely the individual molecules to be converted. The pore openings will therefore be about 6 to 15 Angstroms."

A "metal salt" of a large pore zeolite is one which contains metal ions (Turkevich, Tr. 1987). Sodium ions are one example of metal ions. Kimberlin recognizes that large pore zeolites, as synthesized, are in the sodium form, i.e., they contain only sodium ions (DX-AJ, col. 3, lines 72-74; Turkevich, Tr. 1987-88). Significantly, however, Kimberlin teaches that sodium should be replaced (DX-AJ, col. 3, line 74—col. 4, line 8; Turkevich, Tr. 1987-88; Op. 243):

"In the majority of cases, however, it is desirable to convert the sodium form of the alumino-silicate crystal [large pore zeolite] to a more active form. For this purpose, the sodium crystals are reacted [ion exchanged] with metal salt solutions that enhance the catalytic behavior. These metals are of type already enumerated, and may further include cobalt, nickel, copper, calcium, magnesium, chromium, iron, silver, gold, platinum, zinc, cadmium, *rare earths*, mercury, lead and the like."

This is consistent with the teachings of the prior art patents relating to cracking catalysts composed of amorphous materials: sodium ions are a catalyst poison and must be replaced by ion exchange (e.g., Thomas (DX-AA); Ahlberg (DX-AB); Turkevich, Tr. 1909-25; Op. 240).

Kimberlin includes rare earth metal ions among the replacement ions for sodium ions. As expressly found by the District Court (Op. 243):

"The Kimberlin-Esso patent taught that rare earth metal-exchanged zeolites were effective cracking catalysts and

*Kimberlin specifies the "hydrocarbon conversion" processes in which its new catalyst is useful. These processes include cracking: "The present invention is concerned with a process for the preparation of improved catalysts. It more specifically relates to the preparation of improved catalysts suitable for use in cracking [and other hydrocarbon conversion] processes" (DX-AJ, col. 1, lines 15-19; Turkevich, Tr. 1982).

surpassed in performance their predecessor amorphous catalysts."

Kimberlin's contribution to the zeolite cracking catalyst technology was a highly important one. Any attempt by Mobil to avoid the significance of Kimberlin must be appraised against the following background facts:

(1) Mobil has tried unsuccessfully in extensive Patent Office proceedings to obtain the very patent rights previously granted to Kimberlin (*Frilette v. Kimberlin*, 412 F. 2d 1390 (CCPA 1969); *Application of Frilette*, 436 F. 2d 496 (CCPA 1971); *Frilette v. Kimberlin*, 358 F. Supp. 493 (D. Del. 1973)), and

(2) Mobil recognized the magnitude of Kimberlin's contribution by entering into an arrangement with Esso in 1966 (*before* the Kimberlin reissue patent was granted). By this arrangement, Mobil was granted a royalty-free license under Esso's dominant Kimberlin reissue patent in exchange for a license under Mobil's full portfolio of zeolite-containing cracking catalysts patents. In addition, Mobil was authorized to grant licenses under Kimberlin when it reissued at a royalty rate of 3.6% (Gaboriault, Tr. 3062-67).

Gaboriault, Mobil's chief patent counsel, understood the proper status of Esso's Kimberlin patent in the zeolite-containing composite catalyst field. He testified that the Kimberlin patent is the "grandfather," and that Esso's Kimberlin patent "dominate[s] the Mobil" patents in suit, which are mere "improvement[s]" over Kimberlin (Tr. 3062-64).

The District Court's error in connection with Kimberlin (Op. 242-43, 228-29) was the same error as the Court committed with respect to Fleck. The District Court treated Kimberlin's teachings as a separate segment of the prior art, rather than considering Kimberlin together with Fleck and the other prior art relied on by Grace.

(c) *Rabo '990 taught that zeolite Y is a more effective catalyst than zeolite X and taught the preparation of the rare earth-hydrogen form of zeolite Y*

Rabo patent application Serial No. 862,990 ("Rabo '990") was filed in December 1959 (DX-AM-2, p. 1). It is the parent

application on which the application for Union Carbide's Rabo patent 3,236,762 was based, and is effective prior art against Mobil's '253 and '357 patents in suit.*

Rabo '990 discloses the large pore zeolite components of Mobil's '357 and '253 patents, adding to Fleck an explicit teaching that ion-exchanged forms of zeolite Y are more effective catalysts than corresponding ion-exchanged forms of zeolite X and an explicit teaching of the preparation of a large pore zeolite (zeolite Y) containing both rare earth metal ions and hydrogen (or hydrogen precursor) ions.

Judge Clarie properly recognized Rabo '990's teaching that ion-exchanged forms of zeolite Y, in which a portion of the sodium has been replaced, are useful catalysts for a wide variety of hydrocarbon conversion processes, including cracking (Op. 244):

"[Rabo] teaches that ion-exchanged zeolite Y is an active catalyst for many hydrocarbon conversion processes including cracking (Tr. 2011-2012); and that replacing by base-exchanging the alkali monovalent metal cations, such as sodium, with polyvalent metal cations having more than one charge, such as calcium and rare earths, enhances the catalytic activity of zeolite Y. After zeolite Y has been base-exchanged with polyvalent cations, additional alkali-metal cations can be removed by base-exchange with specified non-metal cations, such as ammonium [hydrogen precursor] cations (Tr. 2014-2015), which decompose on thermal treatment and leave protons or hydrogen ions on the surface. Rabo found that he got the highest polyvalent activity from calcium and cerium [a rare earth metal] ion exchange and that ion exchanged zeolite Y was more active and selective than ion exchanged zeolite X. He also determined that ion exchanged zeolite Y had higher cracking activity than silica-alumina (Tr. 2024)."

*Rabo '990 and the issued Rabo patent are in evidence as Defendant's Exhibits AM-2 and AM-1, respectively. Trial testimony regarding teachings of Rabo '990 appears at Tr. 2009-24, 2074, 2205-35, 2525-53, 2611-25, 2655, 3189-92, 3204-05. The District Court's findings appear at Op. 244, 213, 226, 228, 238-39, 240.

In sum, Judge Clarie found no criticism of Rabo *per se*. But he concluded erroneously that Rabo was irrelevant to the issue of obviousness because the remaining step of putting Rabo's Y zeolite catalyst in a matrix was "more a matter of hindsight, rather than logical anticipation" (Op. 244). Once again, this error was based on Judge Clarie's consideration of the prior art in terms of isolated segments, rather than in terms of its total teachings.

2. The Inconsequential Differences between the Prior Art and the Claims in Suit Do Not Entitle Mobil to a Seventeen-Year Monopoly

Having developed in detail the teachings of the pertinent prior art, we now analyze the Mobil claims in suit and their relationship to the prior art. We acknowledge in advance that the comparisons between the individual patent claims relied on by Mobil and the prior art are unavoidably detailed. Such detailed comparisons are, however, necessary to isolate the "differences between the prior art and the claims at issue," *Graham v. John Deere Co.*, 383 U. S. 1, 17 (1966). Significantly, the lower Court's opinion does not contain such a painstaking analysis. Had the District Court undertaken this detailed but essential task, we submit that its conclusion inevitably would have been one of obviousness, rather than of non-obviousness.

(a) *The subject matter of the '249 patent claims would have been obvious in 1957 to one ordinarily skilled in the catalyst art who had been informed of Kimberlin and Fleck*

Mobil has relied on one process claim (claim 15), one composition claim (claim 19), and one method of making claim (claim 1) of its '249 patent.

(i) *Claim 15—cracking hydrocarbons*

Claim 15 describes a process for cracking a hydrocarbon charge under specified catalytic cracking conditions "with the catalytic composition of claim 14." Hydrocarbon cracking processes are indisputably old. Consequently, claim 15 is entitled to the stamp of validity only if the catalyst described by claim 14 would have been non-obvious.

Claim 14 describes a two-component (finely divided, large pore crystalline zeolite plus inorganic oxide gel matrix) catalyst.

The composite catalyst is in the form of spheroidal particles and contains less than one weight percent of sodium.

Every aspect of the catalyst of claim 14 is rendered obvious by the prior art Fleck and Kimberlin patents considered together.

Kimberlin discloses the hydrocarbon cracking capacity of large pore zeolites in ion-exchanged form (Op. 242-43; Turkevich, Tr. 2065-67, 1982). Fleck demonstrates the feasibility of preparing a composite cracking catalyst, in the form of spheroidal particles, by distributing large pore zeolites in a silica-alumina matrix (Op. 244-45; Turkevich, Tr. 2065-69, 2072). It would have been obvious to mix Kimberlin's ion-exchanged zeolite with the Fleck matrix and to use the resulting composite catalyst for cracking hydrocarbons (Turkevich, Tr. 2065-66).

The rare earth ion-exchanged form of Kimberlin's zeolite (which was more active than silica-alumina) was too active, too small, and too attrition-prone to be used alone in pure undiluted form in existing commercial cracking apparatus (Op. 243; DX-E, pp. 86, 89, 95-96, 99, 100; Turkevich, Tr. 2037-38). Diluting Kimberlin's highly active rare earth-exchanged large pore zeolite with Fleck's attrition-resistant silica-alumina matrix of proper particle size would produce a catalyst having the catalytic qualities of Kimberlin's zeolite and the physical properties of Fleck's matrix (Turkevich, Tr. 2062-63).

(ii) *Claim 19—a catalytic composition*

Claim 19 describes a large pore crystalline zeolite-plus-matrix catalyst, having all of the details of the catalyst described by claim 14, plus two others:

- (1) The zeolite component is substantially sodium-free, has a weight mean particle diameter of less than 10 microns and constitutes a minor proportion of the catalyst, and
- (2) The matrix component is either silica or another inorganic oxide which contains silica, such as silica-alumina.

Claim 19 is invalid for obviousness over Fleck plus Kimberlin, which, taken together, teach these additional details. Fleck discloses both silica-alumina (an inorganic oxide) and clay as matrix components for his zeolite-containing composite catalyst (Op. 244-45; Turkevich, Tr. 2065, 2039-46). Fleck's zeolite X component has the weight mean particle diameter

specified in the claim (Turkevich, Tr. 1942-46, 2069, 2038), and Fleck's zeolite X constitutes a minor proportion of his catalyst (Turkevich, Tr. 2070, 2046-47).

The use of a low sodium zeolite for cracking purposes would have been obvious in light of Kimberlin and also in light of the cumulative teachings of the prior art regarding the inherent disadvantages attributable to high sodium content (Op. 240; Turkevich, Tr. 2070-71, 1953-54, 1909-22).

(iii) *Claim 1—a method of making a catalyst*

Claim 1 describes a five-step method for preparing a two-component (large pore crystalline zeolite plus matrix) catalyst. The steps are:

- (1) combining a finely divided, large pore crystalline zeolite in the alkali metal (e.g., sodium) form with a matrix consisting of an inorganic oxide containing silica (such as silica-alumina);
- (2) ion exchanging the resultant composite until it contains less than one weight percent alkali metal;
- (3) washing the ion-exchanged composite;
- (4) drying the washed composite; and
- (5) thermally activating the dried composite by heating at a temperature in the approximate range of 500° F. to 1500° F.

This claim is invalid for obviousness over Fleck plus Kimberlin. Kimberlin discloses ion exchange of large pore zeolites. Fleck discloses that his catalyst is prepared by manufacturing a "synthetic silica alumina bead catalyst in the customary way,"* with the zeolite "incorporated in the [silica-alumina] gel" and then heating the composite in the range of 500-1200° F. (DX-AN, col. 3, lines 45-56; Turkevich, Tr. 2046-48). The only difference between the method outlined by Fleck and the method of claim 1 of the '249 patent is that Fleck does not explicitly instruct that ion exchange continue until there is less than 1% sodium in the

*The customary way of preparing a bead catalyst, as disclosed by Schwartz (Turkevich, Tr. 2046-48), includes the identical five-step process of this claim: a finely divided material is mixed with a silica-alumina matrix; the resultant product is base exchanged; the base-exchanged product is washed; the washed product is dried; the dried product is heated (DX-AE, col. 6, lines 55-64).

composite (Turkevich, Tr. 2069-70). This is a difference of no consequence because the art which preceded Fleck taught that ion exchange should continue until all sodium had been removed (Turkevich, Tr. 1909-22, 1953-54, 2042-43, 2068).

(b) *The subject matter of the '253 patent claims would have been obvious in 1960 to one ordinarily skilled in the catalyst art who had been informed of Rabo '990 and Fleck*

Mobil has relied on one composition claim (claim 19), one process claim (claim 32), and three method of making claims (claims 23, 24 and 28).

(i) Claim 19—a catalytic composition

Claim 19 is dependent upon claim 17 which is, in turn, dependent upon claim 4. This series of incorporations by reference means that claim 19 calls for all of the features specified in claims 17 and 4.

Claim 19 describes a two-component composition which consists of:

(1) a zeolite component containing rare earth cations plus hydrogen ions and/or hydrogen precursor ions which has been mixed with

(2) a matrix component which is porous and which consists of either silica, alumina or silica-alumina.*

Both components are in the prior art. Rabo '990 teaches the preparation of a Y zeolite catalyst containing rare earth cations plus hydrogen ions and/or hydrogen precursor ions (Op. 244; Turkevich, Tr. 2073, 2013-15). Fleck discloses distributing large pore zeolites in a silica-alumina matrix to prepare a composite catalyst (Op. 244-45; Turkevich, Tr. 2065-66, 2039-48).

*Claim 19 also requires with respect to the zeolite component, as do all of the '253 claims in suit, that it have "no more than 0.25 equivalent per gram atom of aluminum of alkali metal cations." This complicated expression means that the zeolite has not more than 25% of a full complement of alkali metal ions (Rosinski, Tr. 560-62), a requirement which does not differentiate the '253 patent claims from the prior art. Rabo '990 discloses zeolites which contain less than 25% of a full complement of alkali metal ions (Turkevich, Tr. 2015-16).

It would have been an obvious and routine step to mix a zeolite Y, containing rare earth cations plus hydrogen ions and/or hydrogen precursor ions, with silica-alumina, in the fashion taught by Fleck for dispersing zeolites in silica-alumina, and for the same reasons that it would have been obvious to combine any large pore zeolite with a silica-alumina matrix: such zeolites are too fine and too fragile to be used without a matrix (Turkevich, Tr. 2037-38, 2062-63).

(ii) *Claim 32—cracking hydrocarbons*

Claim 32 of the '253 patent is dependent upon claim 14 and incorporates all of its details.

Claim 32 describes the concededly old catalytic cracking process (PX-3, col. 42, lines 46-48) in which the specified "improvement" is the use of a catalyst consisting of:

- (1) a large pore zeolite* containing rare earth cations and hydrogen ions as the zeolite component, which has been mixed with
- (2) an inorganic oxide gel (e.g., silica-alumina) component.

This catalyst is indistinguishable from the catalyst described by claim 19, and would have been obvious in light of Rabo '990 and Fleck. To use this catalyst to crack hydrocarbons would have been obvious also because Rabo '990 and Fleck teach explicitly that the respective components which they disclose are useful to catalyze cracking of hydrocarbons.

It follows that claim 32 is invalid for the same reasons as claim 19.

(iii) *Claims 23, 24 and 28—methods of making catalysts*

Claims 23, 24 and 28 of the '253 patent describe two-step methods for preparing zeolite-plus-matrix catalytic compositions.

The steps called for by claim 23 (which incorporates claim 8 by reference) are:

- (1) ion exchanging the zeolite with rare earth ions plus hydrogen and/or hydrogen precursor ions; and

*In claim 32 the large pore zeolite component is identified by the term "faujasite." The District Court found that this term describes synthetic large pore zeolites (e.g., zeolites X and Y) and natural large pore zeolites (Op. 253-54).

(2) admixing the resultant ion-exchanged zeolite with a porous matrix.

Every detail of claim 23 is in the prior art. Rabo '990 discloses ion exchanging zeolite Y with rare earth ions and hydrogen precursor ions (Op. 244; Turkevich, Tr. 2073, 2013-15). Fleck discloses preparation of a catalyst by mixing zeolites with a porous matrix (Op. 244-45; Turkevich, Tr. 2065, 2069-70, 2046-48). Performing this sequence of steps to prepare a zeolite-plus-matrix catalyst in which the zeolite component contains rare earth cations plus hydrogen and/or hydrogen precursor ions was a natural course to follow as soon as large pore crystalline zeolites became available and the catalytic properties of their rare earth hydrogen-exchanged form became known.

Claims 24 and 28 (which are dependent upon claims 9 and 11, respectively) add nothing not in the prior art. Claim 24 specifies that the ion exchange of the zeolite ingredient be carried out in conventional fashion with a fluid medium. Rabo '990 discloses ion exchange with a water solution—a "fluid medium." Claim 28 specifies faujasite as the zeolite ingredient. Zeolite Y, disclosed in Rabo '990, is a synthetic faujasite.

(c) *The subject matter of the '357 patent claims would have been obvious in 1960 to one ordinarily skilled in the catalyst art who had been informed of Rabo '990 and Fleck*

Mobil has relied on four composition claims (claims 7, 9, 10 and 17) and two method of making claims (claims 19 and 20).

(i) *Claims 7, 9, 10 and 17—catalytic compositions*

Claims 9, 10 and 17 of the '357 patent describe two-component, zeolite Y-plus-matrix catalytic compositions.

The catalyst of claim 10 consists of:

- (1) A Y zeolite component, containing rare earth metal ions and hydrogen ions; and
- (2) a matrix component.

This claim is invalid for the same reasons that claim 19 of the '253 patent is invalid. It would have been obvious in light of Union Carbide's Rabo '990 and of Fleck to disperse a Y zeolite containing rare earth ions and hydrogen ions in a matrix.

Claim 9 of the '357 patent describes a catalyst which contains less than 2 weight percent alkali metal and which consists of:

- (1) a Y zeolite component, containing rare earth metal cations; and
- (2) a porous matrix component, such as silica-alumina or clay, which possesses "intrinsic catalyst activity."

The catalyst described by claim 9 would have been obvious for the same reasons as the catalyst described by claim 10. The additional limitations of claim 9 with respect to alkali metal content and with respect to the activity of the matrix component do not make the catalyst described by this claim patentable. The prior art taught the undesirability of alkali metals in both zeolite catalysts and in silica-alumina catalysts (Op. 240; Turkevich, Tr. 2067-68, 1909-22, 1953-54, 2012-16). The matrices disclosed in Fleck, silica-alumina and clay, were well known commercial cracking catalysts and, therefore, possessed "intrinsic catalyst activity" (Turkevich, Tr. 2072, 2045-46).

Claim 17 describes a two-component catalyst, which is in the form of spheroidal particles and comprises:

- (1) a substantially alkali-metal-free Y zeolite component, present in the amount of 1 to 50 weight percent of the composite, and
- (2) an inorganic oxide gel matrix component consisting of silica, alumina, or inorganic oxides which contain silica, such as silica-alumina.

This claim is foreshadowed in all respects by the prior art. Rabo '990 discloses substantially alkali-metal-free zeolite Y as a hydrocarbon conversion catalyst (Turkevich, Tr. 2015-16). Fleck discloses composite cracking catalysts in the form of spheroidal particles which contain a zeolite component, in the amount of 1 to 50 weight percent, and a silica-alumina gel matrix component (Turkevich, Tr. 2070, 2068-69, 2039-46). It would have been obvious to add substantially sodium-free zeolite Y to silica-alumina to take advantage of the recognized superior qualities of each: the activity of the zeolite; the attrition resistance and particle size of the silica-alumina (Turkevich, Tr. 2074, 2073, 2023-24, 2062-63, 2037-38).

Claim 7 of the '357 patent describes a three-component catalyst which comprises:

- (1) a substantially alkali-metal free Y zeolite component;
- (2) a matrix component; and
- (3) "a secondary solid additive capable of imparting increased diffusivity," which is specified to be clay.

The only thing which claim 7 adds to claim 17 is the diffusivity additive. Such additives were not new in cracking catalysts. The Cramer patent (DX-AF; Turkevich, Tr. 1949-52) discloses the addition of finely divided crystalline alumina to a matrix for the purpose of increasing diffusivity. It was apparent that clay could perform the same function (Turkevich, Tr. 2075). Thus, it would have been a straightforward step to blend together a substantially sodium-free Y zeolite, clay, and a matrix for the purpose of producing a highly active, large particle, attrition-resistant composite catalyst which would have the added characteristic of high diffusivity (Turkevich, Tr. 2074-75).

(ii) *Claims 19 and 20—methods of making catalysts*

Claims 19 and 20 of the '357 patent describe methods for preparing two-component catalytic compositions.

The steps called for by claim 19 are:

- (1) "admixing" a finely divided alkali metal Y zeolite with a binder; and
- (2) ion exchanging the resultant composite to replace 70% of the alkali metal content of the zeolite and to reduce the alkali metal content of the composite to less than 3 weight percent.

The method outlined by claim 19 is simply an abbreviated version of the method of Fleck. The only difference recited in claim 19 is the identification of the finely divided ingredient as zeolite Y. This difference is insignificant: as soon as zeolite Y became available and its catalytic properties became known, it was an exercise of common sense logic, following the path plainly charted by Fleck, to prepare a composite catalyst by adding this new zeolite to a matrix or binder and ion exchanging the resultant composite.

Claim 20 calls for:

- (1) admixing an ion-exchanged Y zeolite, having less than 30% of its original alkali metal ions, with a matrix;
- (2) drying the resultant composite; and
- (3) calcining the dried composite.

This is another routine modification of Fleck's method of preparing a composite catalyst—adding to a matrix an ion-exchanged Y zeolite, such as those disclosed in Rabo '990 in lieu of another large pore zeolite. The recognized catalytic capacity of ion-exchanged forms of zeolite Y places this emendation in the clearly obvious category (Turkevich, Tr. 2073-74, 2023-24).

3. The District Court Committed a Series of Errors in Reaching Its Conclusion of Non-Obviousness

The preceding discussion demonstrates that the differences between the collective teachings of the pertinent prior art and the patent claims in suit are non-existent. But the District Court fell into error by failing to measure the patent claims against the totality of the prior art's teachings. As said in *Mr. Hanger, Inc. v. Cut Rate Plastic Hangers, Inc.*, 372 F. Supp. 88, 92 (E. D. N. Y. 1974):

“the test of obviousness is not express suggestion of the claimed invention in any or all of the references but rather what the references taken collectively would suggest to those of ordinary skill in the art *presumed* to be familiar with them.” (Emphasis in original)

Instead of appraising Mobil's patent claims in the light of the full panoply of the prior art teachings, the District Court chose to point out what was missing from individual prior art references. For example, the lower Court pointed to the undisputed fact that none of the prior patents relating to amorphous silica-alumina catalysts “teaches or suggests the use of crystalline zeolites for cracking purposes” (Op. 228). In the same fashion, the trial Court pointed to another undisputed fact, i.e., the Milton and Breck patents which record the discoveries of zeolites X and Y, respectively, did not contain “any teachings as to their use as gas oil cracking catalysts” (Op. 228). No contention was

ever made that they did.* These aspects of the prior art's teachings are found in Kimberlin and in Rabo '990.

The District Court apparently regarded these acknowledged shortcomings as "negative teachings" in the catalyst art (Op. 227). It treated them in this category along with an attempt by Houdry, a catalyst manufacturer, to use synthetic zeolites for cracking purposes and with the use by Texaco of such zeolites for adsorptive, as distinguished from catalytic cracking, purposes. In this exercise, the District Court again failed to take into account the full facts: the synthetic zeolites used by Houdry and Texaco were small pore zeolites (Kirkbride, Tr. 271-72; Rosinski, Tr. 751), zeolites which are concededly not suitable as cracking catalysts because their pores were not large enough for that purpose (Kirkbride, Tr. 269-72; Turkevich, Tr. 1986-87, 2061-62).

Also, in his discussion of "negative teachings," Judge Clarie found that it "was also common knowledge that, if zeolites were base-exchanged to the acid or ammonium form, they would 'peptize' and become so small that they could not be effectively handled (Tr. 442-444; 2668-2671; PX-140)" (Op. 227). This finding is both unsupported and immaterial. None of the evidence cited in the finding supports the conclusion that it was "common knowledge" that zeolites would peptize if base exchanged to the acid or ammonium form. But, even if it did, such knowledge would be immaterial to the validity of Mobil's patent claims because the prior art taught also that sodium can be removed from zeolites by base exchange with metals (e.g., rare earths) and by base exchange with metals (e.g., rare earths) plus ammonium or acids (Op. 219, 242-44). Consequently, it was never necessary to base exchange zeolites to the purely acid or ammonium form in order to remove sodium; peptization was never a genuine risk or concern.

*In a clearly erroneous finding or in an inadvertence, the District Court mistakenly stated (Op. 226) that a Milton and Breck prior patent "teach[es] the use of synthetic large pore crystalline aluminosilicate zeolites as cracking catalysts, and that the removal of two-thirds of the sodium improves catalytic activity and selectivity." The prior art patent which the Court must have had in mind in making this summary of its teachings is the Kimberlin patent.

(a) *The trial Court apparently failed to take into account the persuasive evidence which establishes obviousness*

When resolving the issue of obviousness in cases involving unfamiliar technology, Courts are often required to reach a conclusion of what would or what would not have been obvious simply by isolating the differences between the prior art and the patent claims in suit and then deciding, without additional enlightenment, whether these differences would have been within the ordinary reach of the art.

The record here provides such additional enlightenment. Competent evidence, none of which is discussed in the Memorandum of Decision below, establishes that it was in fact obvious to those skilled in the catalytic cracking art, when they became aware of the catalytic cracking characteristics of zeolites X and Y, to prepare composite cracking catalysts consisting of these new, large pore synthetic zeolites in ion-exchanged form in matrices of silica-alumina or clay.

This evidence, which supplements the Fleck prior art patent's teaching that zeolites can be used in cracking processes if dispersed in a matrix, consists of the approximately contemporaneous work and proposals of Esso and Union Carbide personnel.* Such contemporaneous and independent incidents are persuasive and confirmatory evidence that the claimed inventions would have been obvious to one ordinarily skilled in the art under 35 U. S. C. § 103. For example, in *Continental Can Company v. Old Dominion Box Company*, 393 F. 2d 321, 327 (2 Cir. 1968), the Court relied on such evidence in support of a conclusion of obviousness:

"Thus the sketches of Arneson and his patent applications are evidence of a simultaneous invention and while not in the realm of anticipation or of prior art, nevertheless buttress the conclusion negating nonobviousness of the Weiss invention. [Citing cases.]"

*Pertinent also is the suggestion by Mobil's Schwartz of a composite catalyst consisting of a zeolite dispersed in an inorganic oxide gel matrix (DX-AAT; Rosinski, Tr. 742-44).

Accord: *Reeves Brothers, Inc. v. U. S. Laminating Corp.*, 417 F. 2d 869, 872 (2 Cir. 1969).

(i) *The independent, contemporaneous "invention" by Esso*

Esso Research and Engineering Co. is the assignee of the Kimberlin patent (DX-AJ). Esso, along with Humble Oil & Refining Company ("Humble"), is a wholly owned subsidiary of Standard Oil of New Jersey (DX-AAK). In answer to questions propounded to Humble under Rule 31, F.R.Civ.P., a designated representative of Humble testified that prior to the end of December 1961,* personnel at the Esso Research Laboratory located at the Baton Rouge refinery of Humble had prepared and tested a composite fluid cracking catalyst containing two components: (a) a minor proportion of an X-type or Y-type zeolite which had been ion exchanged with a non-alkali metal (a metal other than sodium) ion, and (b) a major proportion of an inorganic oxide (DX-AAK).

(ii) *The independent, contemporaneous "invention" by Union Carbide*

Dr. Jule A. Rabo,** an employee of Union Carbide, testified in answer to written questions propounded under Rule 31, F.R. Civ.P. (DX-W) that in early 1959, while in charge of Union Carbide's catalyst laboratory facilities (DX-W, Rabo, Dep. Tr. 7), he made entries in his laboratory notebook regarding (a) the superior cracking activity of base-exchanged X and Y zeolites as compared to silica-alumina gel catalysts (DX-W, Rabo, Dep. Tr. 9-10) and (b) the preparation of a composite cracking catalyst containing from 10 to 90% base-exchanged X or Y zeolite, the remainder being clay (DX-W, Rabo, Dep. Tr. 10-11). The latter notebook entry specified divalent (calcium is a divalent

*This is prior to the initial public announcement by Mobil in the spring of 1962 of its first zeolite-containing moving-bed catalyst, Durabead 5 (Kirkbride, Tr. 246).

**The same Rabo as the one named in the Rabo '990 prior art patent application.

ion) or polyvalent (rare earth is a polyvalent ion) ions as suitable replacements for the original sodium ions of the zeolites.

This evidence that workers at Esso and Carbide independently arrived at the broad idea of composite zeolite-containing catalysts confirms the obviousness of the inventions in suit. It is significant that the lower Court, although necessarily informed by Grace's post-trial briefs of the facts established in the record concerning this work by others than Mobil and of its legal significance on the issues of obviousness,* ignored such evidence completely in its Memorandum of Decision.

(b) *The trial Court accorded undue weight to the "secondary considerations"*

We do not dispute that the zeolite-containing cracking catalysts which are the subject of Mobil's patents are superior to pre-existing silica-alumina catalysts and have had outstanding commercial success. The conclusion to be drawn from these facts should, however, be approached with caution.** As pointed out by this Court in *Preuss v. General Electric Co.*, 392 F. 2d 29, 33 (2 Cir. 1968):

"The trial judge placed great emphasis on the secondary, supporting issues. He did not focus on the inventive process so much as the after-the-discovery results and occurrences. He concluded that Crosby's results filled a real need in the industry. He bolstered this finding by emphasizing the acclaim accorded Crosby and the

*Defendant's Brief After Trial, pp. 62-63; Defendant's Reply Brief After Trial, pp. 39-40.

**The District Court's reliance on the results produced by the Plank and Rosinski catalysts was unsound as a matter of law. Even if the results produced were unexpected, they could not save the validity of the claims here on appeal. *Preuss v. General Electric Co.*, 392 F. 2d 29, 33-34 (2 Cir. 1968). Of equal or greater importance, the results produced by Plank and Rosinski's catalysts were not unexpected. Plank and Rosinski combined one prior art catalyst (silica-alumina) which was capable of cracking gas oil into gasoline with another prior art catalyst (large pore zeolites) which had the same capacity, albeit to a greater degree, to produce a third catalyst (large pore zeolite plus matrix) which produced the expected result of cracking gas oil into gasoline.

resultant commercial success of his invention. Although the issues the trial judge relied on may be appropriate for consideration, *Ling-Temco-Vought, Inc. v. Kollsman Instrument Corp.*, *supra* at 269, they are not to carry too heavy a burden. *Graham v. John Deere Co. of Kansas City*, *supra* at 383 U. S. 29-30, 36 86 S. Ct. 684. We place primary reliance on the technical facts of the inventive process; we think that the secondary issues relied on by the trial judge to reach an opposite conclusion either support our determination or are simply inconclusive." (Emphasis in original)

The concededly superior performance and advantages of the catalysts of Mobil's patents are attributable in large measure to the large pore zeolites incorporated in the patented catalysts. But Mobil's inventors, as already noted, did not originate large pore zeolites and were not the first to use them as cracking catalysts. These developments must be credited to Union Carbide and to Esso, to each of which Grace is paying tribute in the form of royalties as a patent licensee (DX-WC; DX-NY; Goodall, Tr. 2821-24). The Mobil patents in suit are admittedly at most "improvements" over Esso's dominant Kimberlin patent (Gaboriault, Tr. 3062-64).

Furthermore, the trial Court relied repeatedly on the existence of a long-standing problem to reach its conclusion of non-obviousness (Op. 217-18, 234-35, 236). In doing so, the Court below committed errors of both fact and law. The fact-finding errors related to the time when large pore synthetic zeolites first became available. This District Court's findings on this significant point were, at best, a melange of inconsistencies. At one point in its extensive Memorandum, the District Court found correctly that zeolite X "did not become available until 1956 (Rosinski Tr. 751)" (Op. 241). In light of Plank and Rosinski's 1957 date of "invention" (Op. 220), this finding, if it had been left unobscured by other inaccurate findings, would have pointed the District Court to a conclusion that the alleged "inventions" were obvious. As stated by this Court in *Ruben Condenser Co. v. Aerovox Corporation*, 77 F. 2d 266, 268 (2 Cir. 1935):

"While it is always the safest course to test a putative invention by what went before and what came after, it is easy to be misled. Nothing is less reliable than uncritically to accept its welcome by the art, even though it displace what went before. If the machine or composition appears shortly after some obstacle to its creation, technical or economic, has been removed, we should scrutinize its success jealously; if at about the same time others begin the same experiments in the same or nearby fields, or if these come to fruition soon after the patentee's, the same is true. Such a race does not indicate invention."

The District Court dissipated the force of its important and accurate finding of the availability of zeolite X in 1956 by finding inconsistently (Op. 228) that zeolite X was "known to the art" in 1953. The District Court expressly relied on, and accorded much significance to, the erroneous 1953 date—unsupported by any evidence and contrary to the proofs of both parties—to buttress its conclusion that the subject matter of Mobil's patents would not have been obvious (Op. 228).^{*} The Court referred repeatedly (e.g., Op. 218, 235) to the fact that the Mobil patents had been preceded by a 20-year period barren of new developments in the cracking catalyst field, a fact of no consequence because of the short-time availability of large pore synthetic zeolites, the *sine qua non* of Mobil's patents. The District Court compounded this error, by basing its conclusion of patent validity on the following unsound summary of the facts (Op. 236):

"Although all of the individual elements of the patented synergistic combinations may have long been known and available individually prior to Dr. Plank and Rosinski, no one possessed the genius to create the patented inven-

^{*}The District Court repeated the same error with respect to the availability of zeolite Y. The proofs of both parties are that zeolite Y became available in 1960 (Rosinski, Tr. 937; Turkevich, Tr. 1956), the same year that the subject matter of the '357 patent was "invented" (Op. 228). Nevertheless, the Court found inaccurately that zeolite Y was "being experimented with industrially" in 1953 (Op. 228).

tions, despite the urgent and longfelt need for better cracking catalysts. *United States v. Adams, supra*; *National Latex Products Co. v. Sun Rubber Co., supra*."

Because of the short-time availability of large pore zeolites, this is not a case in which a problem of long-standing had plagued an industry while all of the "elements" required to solve it were available. In rejecting contentions of long-felt need, the Courts have often pointed to the recent availability of materials required in making the inventions in question. *Universal Oil Co. v. Globe Co.*, 322 U. S. 471, 486-87 (1944); *Spray-Bilt, Inc. v. Ingersoll-Rand World Trade, Limited*, 350 F. 2d 99, 107 (5 Cir. 1965); *E. J. Brooks Company v. Stoffel Seals Corporation*, 266 F. 2d 841, 842 (2 Cir. 1959); *Zoomar, Inc. v. Paillard Products*, 258 F. 2d 527, 530 (2 Cir. 1958); *Perma-Fit Shoulder Pad Co. v. Best Made, Etc.*, 218 F. 2d 747, 751 (2 Cir. 1955).

The fact that in this case there were no new developments in the years which preceded the availability of large pore zeolites is irrelevant. Until large pore zeolites became available, there could be no large pore zeolite-containing catalysts. *Graham v. John Deere Co.*, 383 U. S. 1, 35-36 (1966); *Dempster Brothers, Inc. v. Buffalo Metal Container Corp.*, 352 F. 2d 420, 422-23 (2 Cir. 1965).

4. The Patented Catalysts Were Logical Outgrowths of the Prior Art

The District Court summarized (Op. 218-22) the experimental work done by Plank and Rosinski in arriving at the catalysts described in the patents in suit. This work, and the District Court's recital of it, underscores the obvious, rather than the non-obvious, character of Mobil's patented inventions.

As a starting point, we emphasize once more that Mobil's patented composite catalysts come down to mixing together:

First, a zeolite component having the desirable properties of high activity and selectivity for cracking purposes, but characterized also by the undesirable properties of fragility, low attrition resistance, and low mechanical stability (Rosinski, Tr. 839-42, 843, 882-85; Kirkbride, Tr. 290-305, 309-10, 306).

Second, a matrix component—the conventional silica-alumina cracking catalyst—which had long been recognized as a highly attrition-resistant and stable catalyst, but one which was less active and selective than the newly available crystalline zeolites (Rosinski, Tr. 731-38, 842-43, 882-84; Kirkbride, Tr. 288-89).

To take advantage of the individual characteristics of these components and in recognition of the faults inherent in the zeolite, Plank and Rosinski mixed together these two components to produce a zeolite-containing composite catalyst (Rosinski, Tr. 882-85). The concessions made by Plank and Rosinski at trial, and also mentioned in the District Court's opinion, cast light on the insignificant stature of their development:

(a) Rosinski conceded (Tr. 707-14) and the District Court found (Op. 219, 233) that Plank and Rosinski had not originated—even intramurally at Mobil—the broad concept of ion exchanging zeolites with both metal ions (e.g., rare earth, calcium) and ammonium ions to make them useful for catalytic cracking. In affidavits filed in the Patent Office (e.g., DX-BS), Plank and Rosinski credited this concept to their Mobil colleagues, Frilette and Weisz. And Rosinski acknowledged (Tr. 1573-74) that Frilette and Weisz's prior work included the use of zeolite X after ion exchange with calcium ions and hydrogen ions or hydrogen precursor ions.*

(b) Rosinski conceded (Tr. 725-29) and the District Court found (Op. 233) that Plank and Rosinski were not the first at Mobil to base exchange large pore zeolites with rare earth ions for catalytic cracking purposes. This had been done before them by their co-worker Hart, who had also recognized prior to Plank and Rosinski the steam stable character of such rare earth-exchanged zeolites (DX-CE; Rosinski, Tr. 878-82).

(c) Plank and Rosinski were aware of what had been generally known for years in the catalyst field, namely, that sodium ions were a catalyst poison in conventional silica-alumina catalysts and that low sodium content was a long-recognized *desideratum* for cracking catalysts (DX-C, pp.

*Frilette and Weisz were unsuccessful in establishing that they came up with this broad concept prior to Esso's Kimberlin. See cases *supra*, p. 16.

100-01; Turkevich, Tr. 1916-17). The low sodium aspect of Plank and Rosinski's catalysts was nothing new; it was a natural and normal procedure for Plank and Rosinski to reduce the level of sodium ions in their zeolite catalysts.

(d) Plank and Rosinski were aware also that zeolites alone were unsuitable for use in conventional commercial cracking units because:

(i) Their physical ruggedness—or resistance to attrition—was so low that they could not survive in conventional moving-bed cracking units (DX-DD; Rosinski, Tr. 882-83);

(ii) Their catalytic activity was too great for use in commercial moving-bed or fluid units built for less active amorphous catalysts (DX-DD; Rosinski, Tr. 842-44, 883-84);

(iii) They were too expensive to be used alone as catalysts (Rosinski, Tr. 353).

(e) Plank and Rosinski recognized that "[t]hese disadvantages can be obviated by binding the crystalline aluminosilicate in a siliceous gel matrix by a rather specific technique as described herein" (DX-DD).

(f) Rosinski conceded (Tr. 884-85, 730-38) that in mixing together the two components of their catalysts, the "specific technique" which he and Plank followed in virtually all respects was that of Mobil's prior art Schwartz patent (DX-AE).

The resulting composite catalyst took advantage of the known characteristics of the zeolite ingredient and of the known characteristics of the amorphous silica-alumina ingredient (Rosinski, Tr. 1041-46).*

*The District Court's characterization of the known physical disadvantages of zeolites, namely, small size, low attrition resistance, and high expense as "negative teachings" (Op. 227) is unsound.

[Footnote continued on following page]

Plank and Rosinski, in a report to Mobil management, candidly described their '249 "invention" as merely diluting a base-exchanged X zeolite with a siliceous matrix (PX-77, p. 100):

"In the case of the bead acid-calcium aluminosilicate the originality lies in diluting a material with the above original properties with a siliceous hydrogel matrix under conditions where the most active constituent of the resulting catalyst is the aluminosilicate."

The making of the other two "inventions" in suit was equally routine.

In early 1960, Plank and Rosinski, aggregating their knowledge of the work at Mobil of Bourguet and Hart* with their own earlier experience in making low sodium zeolite-containing composite catalysts, prepared a composite catalyst by distributing a rare earth-exchanged X zeolite in the same old synthetic silica-alumina matrix. Plank and Rosinski tested this catalyst in April-May 1960 (PX-84) and reported their results in their June monthly report (PX-84, pp. 400201-204; Rosinski, Tr. 495-97). In June of 1960, Plank and Rosinski took another clearly indicated, natural step. They modified the rare earth-containing catalyst by ion exchanging it with ammonium ions in addition to

All of these "disadvantages" required inevitably the combination of the new zeolites with the old, large particle size, attrition-resistant, and inexpensive silica-alumina and clay cracking catalysts. Certainly, these disadvantages did not deter Fleck from adding zeolites to conventional matrix materials. And the obviousness of the idea of overcoming these disadvantages by combining the newly available large pore zeolites with such old catalysts as silica-alumina or clay is confirmed by contemporaneous written proposals of doing just that, recorded by Mobil's Schwartz (DX-AAT) and by Union Carbide's Rabo (DX-W), and also by Esso's independent preparation of such composite catalysts (DX-AAK).

*While Plank and Rosinski were still working with calcium-ammonium-exchanged zeolites, Bourguet and Hart had already base exchanged X zeolites with various metal ions, including rare earth ions (DX-FM; Rosinski, Tr. 725-29), and had tested the resulting zeolites as cracking catalysts. In late 1959, the information that the rare earth-exchanged form of X zeolite gave by far the best results as a cracking catalyst (DX-CB; Plank, Tr. 2680-82) was communicated to Plank (DX-CB; Plank, Tr. 2680-81), before Plank and Rosinski had even considered rare earth-exchanged zeolites (Rosinski, Tr. 484-85).

the rare earth ions, as they had done before with calcium-exchanged zeolites and as specifically taught by the prior art Rabo '990 application to remove more sodium ions from the zeolite (Rosinski, Tr. 563-64; PX-85).

And thus the "invention" of the '253 patent in suit was born: having learned from others of the superior cracking properties of rare earth-exchanged zeolites, Plank and Rosinski simply followed their earlier established routine. They prepared composite catalysts exactly as they had prepared them before, merely substituting for calcium-ammonium-exchanged zeolites rare earth-ammonium-exchanged zeolites also known in the art.

The work of Plank and Rosinski with respect to composite catalysts containing Y zeolites followed a similar pattern of natural development. And once more, they benefited from information obtained from others.

At the end of 1959 or early in 1960, Union Carbide announced a new synthetic zeolite named zeolite Y. This zeolite which is the subject of the prior art Breck patent (DX-AH-1; Turkevich, Tr. 1969-80) was not available in the pure form in 1960 (Rosinski, Tr. 937). However, during the spring of 1960 Rosinski obtained a sample of a Union Carbide zeolite Y-containing catalyst which put him in a position to evaluate base-exchanged Y zeolite as a cracking catalyst. In July 1960 he reported that the Y zeolite was a very active cracking catalyst (DX-EM; Rosinski, Tr. 1961-67). In the fall of 1960, Plank and Rosinski prepared catalysts containing base-exchanged Y zeolites in matrices. Those Y zeolites were made by following the method set forth in a Belgian patent issued to Union Carbide (DX-DS, p. 1).

Zeolite Y was handled by Rosinski in the same way he had previously handled zeolite X. He base exchanged the Y material with the same ions which had previously been used with X zeolites, including rare earth ions and the combination of rare earth ions and ammonium ions (DX-DS, Table 1). To complete the routine, the base-exchanged Y zeolites were diluted by dispersing them in the old silica-alumina matrix, precisely as had been done earlier with X zeolites (DX-DS, Table 2). The "invention" of the '357 patent was the result.

B. The Patents in Suit Are Unenforceable because of Patent Misuse

1. Package Licensing of Patents Has Been Uniformly Condemned

An agreement to sell one product (the "tying product") on condition that the buyer also purchase a different (or "tied") product is classically defined and universally condemned as a tying arrangement. *United States v. Loew's Inc.*, 371 U. S. 38, 45-46 (1962); *Northern Pac. R. Co. v. United States*, 356 U. S. 1, 6 (1958). Package licensing of patents is a specific form of tying in which the patent owner declines to license individual patents at a royalty rate lower than the rate for a license under the entire package. The result is that a potential licensee who desires to have a license under one or more specific patents (the "tying product") is coerced into taking a license under additional patents (the "tied" product). Because package licensing fosters the same evil as other tying arrangements, it is a *per se* patent misuse. *American Securit Co. v. Shatterproof Glass Corp.*, 268 F. 2d 769, 776, 777 (3 Cir. 1959).

The package licensing doctrine applies with equal force if the patent owner offers a license under one or more specific patents at a royalty rate which may be lower than, but which is still not a reasonable economic alternative to, the royalty rate for a license under an entire package of patents. *Hazeltine Research, Inc. v. Zenith Radio Corporation*, 388 F. 2d 25, 34 (7 Cir. 1967), *modified on other grounds*, 395 U. S. 100 (1969). And see *Rocform Corp. v. Acitelli-Standard Concrete Wall, Inc.*, 367 F. 2d 678 (6 Cir. 1966).

In short, a prospective licensee should not be under any coercion or compulsion, based on royalty rates available to him, to take an unwanted license under any patent property. Coercion to accept a package license exists if the licensee must pay the same royalty rate for a license under a single patent or under a few patents as for a license under the larger package. Coercion also exists if the differential in royalty rates between a license under a single patent or under a few patents and under the package is so small as not to represent a reasonable economic

alternative. The net effect is to avoid negotiating for patent licenses on the basis of the intrinsic merit of the rights desired by a licensee.

2. The District Court's Errors Which Resulted in Holding Mobil's Patents Enforceable

The District Court set forth (Op. 245) the details of Mobil's May 1968 offer to Grace (*supra*, p. 8), but ignored the inescapable conclusion that for the four-year period June 1964-May 1968, Mobil had set the same royalty rate for a release under some or all of its patents, irrespective of how many or how few.* Instead, the District Court incomprehensibly found that in its May 1968 proposal Mobil offered "to license Grace under any patent or patents the latter desired" (Op. 249). This finding disregards the fact that Mobil's proposal was not responsive to Grace's request for a license under three patents. Even more importantly, the District Court missed the crucial point: Mobil's offer to release Grace was at the same royalty rate, irrespective of how many patents or how few patents were the subject of the offer. The only conclusion that can be drawn from the District Court's treatment of this critical evidence is that the District Court either did not understand or was unwilling to conclude that Mobil, in response to a specific request from Grace for a license under only three patents, had committed *per se* package licensing. On this basis alone, the District Court has committed reversible error, and the Mobil patents should be rendered unenforceable.

Three earlier requests by Grace during the four-year period ending in 1968 for licenses under individual patents, and Mobil's

*For a release or license for alleged past infringement, Grace would have to pay 12% until April 11, 1967, and 8.4% thereafter, whether Grace took a release or license under five Mobil patents, or under all of Mobil's 40-odd zeolite-containing catalyst patents. The requirement of 12% until April 11, 1967, for rights under the same Mobil patents for which Grace would have to pay only 8.4% thereafter is in effect a confirmation that Mobil's earlier approach, which had required a licensee to pay 12% regardless of how few or how many patents the licensee took, could not properly have been founded on the merits of the patent property involved.

responses, also demonstrate the unlawful nature of Mobil's program of package licensing. The District Court properly found that "From July 1964, until the commencement of this suit in 1967, it [Grace] sought to license one or more of these Mobil patents in order to eliminate any conflict with Mobil's claims for commercial production of the new [Grace] catalyst" (Op. 217), and that Grace had asked Mobil for the terms of a license in July 1964, immediately after Mobil's first five zeolite catalyst patents had issued, "under certain claims in the '249 patent" alone (Op. 247, also 223). Mobil's response was an offer to Grace for a license at a royalty rate of \$200 a ton (i.e., a rate of 25% of the sales price of the Grace catalyst), the royalty rate being precisely the same for rights under either the '249 patent alone or for all Mobil patents (DX-QH; Goodall, Tr. 2777-82). The trial Court's finding that, by this offer, "Mobil expressed a willingness to grant such a license" (Op. 247) to Grace circumvents the controlling issue: again the District Court did not acknowledge that the price was the same for one or all patents.

The District Court's discussion of Grace's second request for a license under a single patent (and of Mobil's second offer) is also flawed. The Court found that "Mobil had expressed a willingness to grant a license for the '249 patent alone at a lower rate" (Op. 247). This finding is contrary to the record which establishes that Mobil's offer of a license under the '249 patent alone was not "at a lower rate"; it was at the same royalty rate as for the package, i.e., \$200 a ton or 25% (Op. 247).*

In the spring of 1965, Grace again requested a license under the '249 patent alone. At that time "Mobil proceeded to prepare, and was ready to send to Grace, a draft of a license granting rights under the '249 patent alone" (Op. 247). This draft, admittedly prepared because of Grace's "expressed desire to review a draft specific to their current catalyst and the Socony patent they feel is a problem for that catalyst" (PX-284, p.1), was never sent to Grace (Gaboriault, Tr. 3001). The District

*In the transcript portion cited by the District Court, Gaboriault, Mobil's chief patent counsel, testified that "We set an identical royalty" in each of these two situations (Tr. 2990).

Court attempted to avoid the impact of these undisputed facts by relying on unsupported speculation that Mobil never sent this draft to Grace in view of the fact that "Mr. Edwards [sic, the Grace negotiator was named "Edmunds"] of Grace advised that this was not adequate, because Grace wanted to solve all of its problems with Mobil's patents" (Op. 247-48).*

In sum, on four separate occasions during the period June 1964 to May 1968, Grace asked Mobil for its royalty rate for a license under one or a selected few of Mobil's patents, and Mobil never responded with an offer at a royalty rate any lower than the rate fixed by Mobil for a license under all of its zeolite catalyst patents.

The District Court never came to grips with these undisputed facts or the legal conclusion which stems from them. Rather, it evaded the issue, electing instead to discuss at length Grace's supposed lack of good faith (Op. 246). Even assuming, *arguendo*, that the District Court was right (it was not) in entertaining doubt about Grace's good faith,** the law does not support its exoneration of Mobil. When package licensing is proved, "If defendant's hands be unclean in that it made no *bona fide* application to plaintiff for licensing, . . . such uncleanliness will not render plaintiff's hands clean if it is attempting to unlawfully extend its patent monopoly. *American Security Co. v. Shatterproof Glass Corp.*, *supra*," *Rocform Corp. v. Acitelli-Standard Concrete Wall, Inc.*, 237 F. Supp. 34, 44 (C. D. Mich. 1964), *aff'd*, 367 F. 2d 678 (6 Cir. 1966). Once patent misuse is established, "whether relief should be withheld must depend on the plaintiffs' [patentee's] and not the defendant's

*The excerpt from Edmunds' deposition testimony relied on by the District Court does not relate to Grace's 1965 request for a license under a single patent (PX-332, Edmunds, Dep. Tr. 237-38). Furthermore, the District Court's reliance on Gaboriault's self-serving, speculative testimony in this connection ignores that it was inconsistent with contemporaneous records and does not even purport to relate to any specific conversation which Gaboriault supposedly had with Edmunds or any other Grace representatives.

**The District Court explicitly noted (Op. 217) that there were sound reasons for Grace to have charted a careful course in negotiating with Mobil and that Grace had sound reasons for its decision not to enter into a license with Mobil. These reasons are catalogued in that passage of the Court's opinion.

[infringer's] conduct," *Anderson Company v. Trico Products Corporation*, 237 F. Supp. 834, 838 (W. D. N. Y. 1964).

The District Court concluded also that Mobil's May 1968 offer for the future of 7% for a license under five specific Mobil patents or 8.4% for a license under 40 or more patents did not constitute patent misuse. Again the District Court was wrong.

In this connection the District Court found that (Op. 250):

"the variations of catalytic claims in this area of manufacture were so variable, intertwined, and complex, that, absent a 'defined field' [*] license, the limiting of catalytic content to specific patents would require continual chemical testing to police the royalty contract (Tr. 3081-3082). A simple comparison of the number of patents encompassed against the price variable of the royalty is not a fair and true test of the dollar value of the *licensees* [sic], especially where the composition of the patented products are so intertwined as to be almost inseparable."

The District Court cites no authority which justifies its conclusion that conjectural problems constitute an excuse for package licensing. We know of none. Furthermore, the trial Court's views of Mobil's potential problems (and the problems of Mobil's licensees) if Mobil had licensed its patents separately are at odds with the industry practice. Grace has three other licenses in the field of zeolite catalyst patents, one from Esso and two from Carbide. None is a "defined field" license. Rather, each is a conventional patent license under specific Esso and Carbide patents (DX-NW, DX-NY, DX-WC). There is no evidence that Esso and Carbide had any difficulty licensing individual zeolite catalyst patents to Grace, or that Grace has had any difficulty in operating under these licenses. Mobil itself has never urged that it would have any such trouble as the District Court hypothesized.

*Mobil refers to the licenses it has offered and granted under its full package of patents as "defined field" licenses. Whatever the meaning of this term, it cannot serve to justify an attempt by Mobil to coerce a licensee to take more than the licensee wants. There is no evidence that any of Mobil's "defined field" licensees ever asked for any other type of license.

Rather, Mobil contradicts the District Court's supposition by repeated statements that Mobil would license individual patents (Gaboriault, Tr. 2998-3001; PX-284; PX-297; Plaintiff's Reply Brief After Trial, p. 41). No problem has been created, or would be created, by licensing individual patents; the roadblock against such licenses has been created by Mobil's refusal to set lower royalty rates for individual patents, as compared with its royalty rate for the package.

The facts are clear. The law is clear. Having failed upon request to fix economically acceptable royalty rates, different from its package rate, for individual patents or for a few selected patents, Mobil has rendered its patents unenforceable.

C. The Mobil Patent Claims in Suit Are Not Infringed

The District Court reached the conclusion that Grace's activities infringe the Mobil patent claims in suit by:

(1) applying the "doctrine of equivalents," on the purported basis that Grace's catalysts performed the same function in substantially the same manner as Mobil's patented catalysts;

(2) brushing aside or glossing over the detailed limitations of Mobil's patent claims and the differences between them and the Grace catalysts.

The facts do not support the District Court's invocation of the doctrine of equivalents. Indeed, the evidence regarding equivalency amounts to nothing more than establishing that Grace's catalysts achieve the superior results asserted by Mobil for its patented catalysts. More than this is required, *Air Device v. Air Factors*, 210 F. 2d 481, 483 (9 Cir. 1954):

"The fact that the two devices accomplish the same result, or perform the same function, settles nothing about infringement."

We have pointed out (*supra*, p. 9) that Mobil's patentees concentrated their efforts on, and Mobil's patents are directed primarily to, moving-bed, rather than to fluid, cracking catalysts.

On established principles, the scope of the protection afforded to Mobil by its patents should be similarly restricted and Grace's catalysts should be held not to have infringed. Illustrative authorities are *Westinghouse v. Boyden Power Brake Co.*, 170 U. S. 537, 568-69 (1898), and *Svenska Aeroplan Aktiebolaget v. Mergenthaler Lino. Co.*, 410 F. 2d 979, 983 (2 Cir. 1969).

Considering next the detailed limitations of Mobil's patent claims:

(1) Several of Mobil's patent claims* specify an inorganic oxide gel matrix; Grace has never used such a matrix except in its first zeolite catalyst (XZ-15), which, strangely enough, was not even challenged by Mobil as an infringement of its patents. Clay, concededly not an inorganic oxide gel (Kirkbride, Tr. 1779), is used as an ingredient in Grace's challenged catalysts and, indeed, is an important distinction between an unsuccessful Grace catalyst (XZ-12) and a highly successful one (XZ-25). Mobil's own scientists referred in 1965 and 1969 to the matrices of two challenged Grace catalysts as "clay" (DX-BAD; DX-BAF).**

(2) Another important distinction between Mobil's patent claims and the asserted infringements relates to the manufacturing processes called for by the claims and those used by Grace. Mobil's '249 and '357 patents describe three different kinds of heating steps: (a) drying, (b) calcining, and (c) steaming (hydrothermal treating). The pertinent claims in suit*** specifically call for a calcining step, concededly not performed by Grace in its manufacture of fluid catalysts (Op. 253). In reaching its conclusion of infringement, the Court below adopted Mobil's contention that Grace's refinery customers perform this step (*id.*). In doing so, the lower

*Claims 15 and 19 of the '249 patent; claim 32 of the '253 patent; claim 17 of the '357 patent.

**Claim 7 of the '357 patent is not infringed for a related reason. That claim calls for a "secondary solid additive" to be suspended in a matrix. In urging infringement of this claim, Mobil contended that clay, which it had previously characterized as the matrix, somehow became transmuted for the purpose of this lawsuit into a "secondary solid additive."

***Claim 1 of the '249 patent and claim 20 of the '357 patent.

Court ignored that the record established that Grace's customers *steam* catalysts (Kirkbride, Tr. 3239), a procedure which is different from *calcining* (Blazek, Tr. 2353-59). It follows that these claims, which require calcining, are not infringed, even by the sequence of steps carried out by Grace and subsequently by its customers.*

(3) Other Mobil patent claims are not infringed because Grace does not perform the ion-exchange procedures specified in them. Claims 19, 23, 24 and 28 of the '253 patent require that the zeolite be exchanged with both rare earth ions and hydrogen ions or hydrogen precursor ions before the zeolite is mixed with the matrix. With one minor exception (catalyst OZ-1), Grace's catalysts have not been subjected to the specified ion-exchange procedure. Claim 19 of the '357 patent requires that the zeolite not be ion exchanged (that is, that it remain in its sodium form) until it is mixed with the matrix. Again, with only one minor exception (catalyst CBZ-1), Grace's catalysts have not been prepared in this manner.

(4) Mobil did not prove infringement of claims 9 and 10 of the '357 patent. Claim 9 calls for a zeolite whose ions are solely "rare earth metal" ions and claim 10 calls for a zeolite having both "rare earth metal" and "hydrogen" ions. The same catalyst cannot infringe both claims. Mobil's election to assert these two inconsistent claims against the same product demonstrates its inability to prove infringement of either.**

Grace had substantial non-infringement defenses against Mobil's charges. These defenses were established primarily by cross-examination of Mobil's witnesses. This, in and of itself, is

*The District Court's holding (Op. 253) that these claims are infringed if the calcining step is totally omitted (as it is) is clearly wrong as a matter of law. Omission of any step from a process leads to a conclusion of non-infringement. *Haynes Stellite Co. v. Osage Metal Co.*, 110 F. 2d 11, 14 (10 Cir. 1939).

**The distinction between "rare earth metal zeolites" and "rare earth metal hydrogen [acid] zeolites"—the first having been exchanged with rare earth metals alone and the second with rare earth metals plus hydrogen or a hydrogen precursor, such as ammonium—was made throughout the trial (e.g., Tr. 1021-24, 1526-28, 502-03, 536-39, 574-77, 614-15, 709-12, 1441-42).

a manifestation of the soundness, rather than the unsoundness, of Grace's defenses: "A case that can be made out in all its elements by cross-examination of opposing witnesses is a strong case." *Eibel Co. v. Paper Co.*, 261 U. S. 45, 53 (1923).

D. Injunctive Relief Is Not Appropriate

Should this Court affirm the judgment of the Court below with respect to validity, enforceability and infringement, the Court should, nonetheless, reverse the District Court's grant of injunctive relief (Judgment ¶ 18).

The statutory provision relating to injunctions in patent infringement suits (35 U. S. C. § 283) is cast in permissive, rather than mandatory, terms:

"The several Courts having jurisdiction of cases under this title may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the Court deems reasonable."

The issuance of an injunction in a patent infringement action decided favorably to plaintiff is not a matter of right but, as in the case of injunctions generally,* should not be issued where there is an adequate remedy at law (i.e., damages).

Apposite is *Foster v. American Machine & Foundry Co.*, 492 F. 2d 1317 (2 Cir. 1974), decided after the Court below ruled against Grace on the issue of appropriateness of injunctive relief. In approving a denial of injunctive relief to a non-manufacturing patentee, this Court stated (492 F. 2d at 1324):

"an injunction would be an inappropriate remedy in this case. An injunction to protect a patent against

*E.g., *Hecht Co. v. Bowles*, 321 U. S. 321, 329-330 (1944):

"The historic injunctive process was designed to deter, not to punish. The essence of equity jurisdiction has been the power of the Chancellor to do equity and to mould each decree to the necessities of the particular case. Flexibility rather than rigidity has distinguished it. The qualities of mercy and practicality have made equity the instrument for nice adjustment and reconciliation between the public interest and private needs as well as between competing private claims."

infringement, like any other injunction, is an equitable remedy to be determined by the circumstances. 35 U. S. C. § 283. It is not intended as a club to be wielded by a patentee to enhance his negotiating stance. See *Hoe v. Boston Daily Advertiser Corp.*, 14 F. 914 (C.C.Mass. 1883). Here, as the District Court noted, the appellee manufactures a product; the appellant does not. In the assessment of relative equities, the Court could properly conclude that to impose irreparable hardship on the infringer by injunction, without any concomitant benefit to the patentee, would be inequitable. *Nerney v. New York, N. H. & H. R. Co.*, 83 F. 2d 409, 410-411 (2 Cir. 1936); *American Safety Device Co. v. Kurland Chemical Co.*, 68 F. 2d 734 (2 Cir. 1934)."

There are two separate reasons, both of which were urged below, for denying injunctive relief to Mobil: (1) injunctive relief would be prejudicial to the public interest, and (2) it would serve no legitimate interest of Mobil and would severely damage Grace.

With respect to the first reason, the public interest merits consideration with respect to the issue of injunctive relief. *City of Milwaukee v. Activated Sludge*, 69 F. 2d 577 (7 Cir. 1934). It is clear that the public interest would be impaired by enjoining "the major producer of cracking catalysts in the world" (Goodall, Tr. 2733-34).

With respect to the second reason, the salient facts are:

(1) Grace and Mobil are not competing manufacturers. Grace manufactures fluid catalysts (Blazek, Tr. 2252); Mobil manufactures moving-bed catalysts, but not fluid catalysts (Drew, Tr. 1845, 1854; Van Tilburg, Tr. 1858).

(2) Mobil's announced purpose is to license its patents for royalties. In this action, counsel for Mobil represented to the trial Court on behalf of Mobil (Tr. 42):

"We are willing to grant them [Grace] a license. We have always held a license out to them, and are willing to license them."

Under the facts of this case an injunction would impose irreparable hardship on Grace, without concomitantly benefiting Mobil. The Court below should have exercised its discretion as a court of equity by denying injunctive relief.

IV. CONCLUSION

The portions of the judgment entered by the Court below appealed from by Grace should be reversed in all respects.

Respectfully submitted,

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APPENDIX

Glossary

Activity—

One of four chief properties characterizing a cracking catalyst; the rate at which the catalyst is capable of converting gas oil into other products.

Aluminosilicate—

A material composed primarily of the three elements, aluminum, oxygen, and silicon, which may have ions associated with it.

Amorphous—

Non-crystalline, having no fixed form or shape; spongelike, having random-size pores.

Angstrom—

A unit of length used to measure molecular size. There are 250 million Angstroms in one inch.

Attrition resistance—

One of four chief properties characterizing a cracking catalyst; the ability of a catalyst to withstand abrasion in a commercial cracking process.

Base exchange—

Process by which one ion in a material is replaced by another ion. The process is carried out by the old and conventional technique of washing zeolites with aqueous salt solutions containing replacement ions. This process is also called ion exchange.

Catalyst—

A material which accelerates (or retards) a process.

Catalytic cracking—

Accelerating cracking by use of a catalyst.

Cracking—

The breaking up of long, heavy gas oil molecule chains into smaller, lighter molecule chains, such as gasoline.

Cations—

Atoms or groups of atoms carrying one or more positive electrical charges. For purposes of this action, the words "cation" and "ion" are interchangeable.

Coke—

A solid carbonaceous material formed as a by-product in cracking of gas oil.

*Appendix***Composite—**

A material made up of two parts or two components.

Crystalline—

Having a fixed, definite internal structure of a regular, repeating character.

Diffusivity—

A property which describes the ability of fluids to pass through a material.

Dry gas—

Light, short hydrocarbon molecule chains.

Faujasite—

A natural mineral which is a large pore zeolite and shares many characteristics with Union Carbide's synthetic zeolites X and Y. The term may be used generally to refer to both natural and synthetic large pore zeolites.

Gas oil—

A portion of the heavier crude oil residue after lighter ingredients of crude oil have been boiled off; it consists of relatively heavy, long hydrocarbon molecule chains.

Gasoline—

End product of catalytic cracking of gas oil; it consists of lighter and shorter hydrocarbon molecule chains than gas oil.

Gel—

A kind of amorphous material: a colloid in a more solid form than a sol. In this action it has been established that the term "gel" excludes clay.

Hydrocarbon—

A class of molecules composed of hydrogen atoms and carbon atoms. Petroleum is a mixture of different types hydrocarbon molecules. One fraction of the mixture is called gasoline; a heavier fraction is called gas oil.

Hydrocracking—

A cracking process carried out in an atmosphere of hydrogen.

Hydrogen precursor—

An ion which upon heating becomes a hydrogen ion. An ammonium ion is a hydrogen precursor. A zeolite which contains hydrogen ions is said to be in the "acid form."

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Both metal (e.g., calcium or rare earth) ions and hydrogen ions may be present; zeolites containing both may be designated as "metal-acid" (e.g., "calcium-acid" or "rare earth-acid") zeolites.

Inorganic oxide—

A material composed of oxygen plus an element or elements other than carbon. Silicon dioxide ("silica"), aluminum oxide ("alumina"), and silica-alumina are inorganic oxides.

Ion exchange—

Process of replacing one ion with another. Ions in large pore zeolites and in silica-alumina are conventionally exchanged by this well known technique; also called base exchange.

Ions—

Atoms or groups of atoms which are electrically charged, either positively (cations) or negatively (anions). In this action only positively charged ions are of concern. Therefore, "ion" and "cation" are used interchangeably.

Large pore zeolite—

A crystalline zeolite having pores large enough to admit the molecules of gas oil. Zeolites X and Y are large pore zeolites.

Matrix—

A material constituting the major portion of a composite, throughout which another material is distributed.

Metallo aluminosilicate—

A crystalline zeolite in its metal-exchanged form, i.e., having metal ions.

Molecular sieve—

A crystalline zeolite.

Rare earth metals—

A class of metals having similar chemical properties and grouped together in the periodic table of elements.

Selectivity—

One of four chief properties characterizing a cracking catalyst; the ability of a catalyst to direct the cracking reaction

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to produce the maximum amount of gasoline, the more desired product, instead of some other product(s).

Silica-alumina—

An amorphous cracking catalyst comprised primarily of the elements silicon, oxygen and aluminum, but containing also exchangeable ions. Sodium ions are present in silica-alumina as it is synthesized. Silica-alumina was the staple catalyst before the availability of large pore zeolites.

Small pore zeolite—

A crystalline zeolite having pores too small to admit the molecules of gas oil. Zeolite A is a small pore zeolite.

Stability—

One of four chief properties characterizing a cracking catalyst; the ability of a catalyst to maintain catalytic qualities during use. In catalytic cracking this means the ability to retain activity and selectivity when exposed to high temperatures and to steam.

Zeolite (crystalline)—

A crystalline aluminosilicate having uniform pores, composed primarily of the elements aluminum, oxygen and silicon, and containing ions which may be replaced with other ions by the old and conventional technique called base exchange. Because the uniform pores will admit or keep out molecules depending on their size, crystalline zeolites are also known as molecular sieves.

Zeolite X—

The first synthetic large pore crystalline zeolite, the subject of Union Carbide's Milton patent.

Zeolite Y—

The second synthetic large pore crystalline zeolite, the subject of Union Carbide's Breck patent.